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ADUTHURAI

AN INTERVIEW WITH SHRI U.N. DHEBAR

DURING the Gosamvardhana Week Celebrations 1961, a special interview with Shri U. N. Dhebar, Ex-President of the Central Council of Gosamvardhana, was broadcast by the All India Radio. Reproduced below is an extract from the said interview :

Question: *Could you kindly tell if it is only from the point of view of religion and social and cultural heritage that we think of cow; is it not essential to think of cow from national point of view?*

Answer: *This has been our one of the most important weaknesses. A question which is essentially national cannot be considered merely as a religious one. Agriculture cannot go without cow in this country. As the land is the basis of our country's economy so is the cow of our land. If the cow is removed away from the land, the land thus left would be incompetent to feed us. I am sure it would be practically impossible to carry on our agriculture without her. The other aspect is also there. Millions of people in this country do not get appropriate nutritional elements in diet which could easily be available in the cow's milk. From this point of view, it becomes a national question.*

Question: *So, Sir, how can people of our country help in this task?*

Answer: *The first thing is, we should convince the farmers in the country that the cow can provide us with not only milk but the bullocks—and thus there can be a sounder agro-economy based on the cow as giver of milk and bullocks. To conceive of cow and agriculture as independent of each other is fallacious. The other thing is that our people should understand that without the cooperation of the peasants we cannot work for the protection and service of the cow. And if we cannot save and develop the cow, the country as well cannot be saved and developed.*

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UR COVER:—Sketch by C. P. TANDAN

Asst. Editor
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Editorial

Need of Co-ordinated work for the development of the Cow

INDIA has a tradition of voluntary work in various fields. In the sphere of the service of the cow, we have innumerable institutions in the form of Gaushalas and Pinjrapoles, the non-official organisations, working primarily for the protection of the cow in particular. In the midst of vicissitudes and handicaps—of economic, organisational and of technical nature—these organisations have been significantly contributing to the cause of the preservation of the cow and her progeny—an objective which has been embodied in the Constitution of India as one of the Directive Principles to guide the policy of the State.

The Governmental organisations, through their departments, technical personnel and administrative machinery have also been contributing to the technical and scientific aspects of development of the cow and ultimately making her more competent to be the basis of our agriculture and giver of protective food.

Every tendency is apt to develop a specific enthusiasm with zealous spirit to foster ahead its own approach towards the problem and its own technique of work. This has been true of Governmental organisations and departments on the one hand; and voluntary organizations working for the cow on the other.

There have been these two different currents of thought and work, working for the cow in their own independent ways. This has sometimes resulted in either a parallel growth of the two techniques of work or sometimes bringing into conflict the currents of these two streams.

The other course and sounder one, is blending of the two, a synthesis of the two currents which can unleash more powerful but calmer flow of current for this work. For this, we have to create a coordinating link inbetween these two techniques of work and approaches towards this problem. The cow cannot be protected without the improvement of her capacity and capability. This needs an attempt at bringing in these two efforts together and thus forging ahead the real development of the cow and cattle wealth—"Gosamvardhana," then only the cow would be the symbol of unifying force and not a disintegrating element. This would require a dispassionate approach from all, a spirit of understanding and appreciation, co-operation, a feeling of give and take.

OUR CIVILISATION WOULD NOT HAVE BEEN WHAT IT IS, BUT FOR THE CARE OF THE COW AND HER MILK

CARE OF THE HOUSE COW

By Dr. D. JAYARAMAN

CARE of the cow for milk production! Is there a need for it? Many claim that feed alone is the answer to production, that breeding, is relatively unimportant. Others hold the view that breeding also plays an important part, and I share this view. It is proved that one third is breeding and two thirds is feeding. It has increased the annual yield of milk from few hundreds to over 40,000 lbs. in the case of some outstanding production cows. This might have been accomplished only through proper care to feeding, breeding and management.

There are several problems when one decides to keep a house cow.

What is the breed:

While selecting an animal much importance should be attached to (a) appearance (b) Pedigree (c) performance (d) and prepotency. The primary aim is to secure an animal which will be profitable to producer and milk over a period of years and transmit to her off-spring to produce, (1) general form or type (2) dairy characters (3) body capacity (4) mammery system (5) size. The milch animal should be free from excess fat or beefiness. Sharpness at the withers, thinner at neck, along the back and in the thighs. It must have large body capacity, deep large wide barrel, large girth, wide chest floor between the front legs, soft and elastic well attached udder, well placed teats, long prominent veins. Within a breed, the large animal with moderate size give higher average yield of milk than those of smaller size. Ongole, Sindi, Sahiwal, Gir are quite good grazers and produce richest milk. A good cow should give on an average 12 to to 16 lbs. of milk per day when properly fed.

How old should the cow be?

Heifers are usually more persistent producers in their first lactation than in later lactation. Their decrease in production from month to month is less rapid. This is probably because, a heifer is growing in body and the amount of secreting glandular tissue in her udder is also increasing. Hence cow on its first and the second calf and which has been trained to give milk is probably the best type for average needs. Older cows or buffaloes, in general, produce more milk, but required to be replaced sooner.

How long will a cow milk?

If mated at the correct time, milk production will continue for 7 to 8 months after calving. It depends on the qualities inherited and how the animal is reared.

When should a cow be mated?

Cows come on heat about four weeks after calving and then about every three weeks.

They should be mated about 2 to 3 months after calving. Heat is evidenced by excitement, bellowing and endeavouring to mount other cows. Arrangements should be made to have a cow taken to the bull a few days before heat is expected. Cow is capable of breeding at all times of the year. Nevertheless there is a natural tendency for the cows under natural conditions to get served from April to July.

How are the cows dried off ?

Cows are most easily dried off by completely ceasing milking, in order to allow for the recovery of worn secretary tissue, development of foetus and maintain her body weight and condition. During the drying off period, concentrates should be eliminated from the diet and access to the succulent feed restricted. Preferably only cereal hay or chaff should be given.

If production is high, milk once daily until production is below 4 lbs. and then milking should cease. After a few days the udder will tend to shrink, indicating reabsorption of the milk into the system.

Main points about milking;

Long hair on the udder and belly near the udder should be clipped. The udder and teats should be wiped with a rag damped in water containing some chlorine disinfectant. Some lubricant, such as vaseline has to be applied on the teats to keep the teats in better condition. The chief principle for milking is that the harmones should be stimulated and the milk should be secreted from the udder as quickly as possible during which the harmone action lasts at regular intervals of the day to achieve maximum production. Remove one or two streams of milk from each teat into a strip cup.

Milking should be done twice daily, without causing any excitement which will prevent cows letting down their milk. Clean vessels are essential for clean milking. Straining immediately after milking is advisable to remove any hair etc. which may have fallen into the milk. Straining should be done through proper cotton wool filter pads.

What care is necessary before and during calving ?

Good feed must be given to the cow during the dry period if milk production is to be satisfactory after calving. Cows should calve in good condition. If pasture is good, supplement with 3 to 5 lb. per day of a good concentrate mixture. During this period the reserve stores of nutrients in her body are built up, her digestive system is cooled and in addition, she is provided with nutrients necessary for the growth for the foetus. A week before calving, the feed should be lighter and more laxative, as this makes calving easier and reduces the chances of udder trouble.

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Most cows require no assistance and will calve within a couple of hours after commencement of labour. If some difficulty is apparent contact a Veterinary Surgeon immediately.

When is Milk ready for use ?

For the first few days after calving a thick, sticky, yellowish secretion known as colostrum comes. After five to sevendays, this would change to normal milk and is fit for household purposes.

How should the cow be fed ?

The main points concerning feeding are *Good pasture* :—An abundant growth of short, leafy grasses and clovers is the best feed of dairy cattle and if there is sufficient of this type of grazing no other type of feed is necessary. However, this is an unusual occurrence. There should be liberal supply of good quantity roughage. This will furnish total digestable nutrients and net energy and also provide minerals and vitamins. In addition to roughage, concentrates are necessary to maintain satisfactory flow of milk.

Legume hay 2-3 lbs. daily per 100 lbs. of live weight. If silage is included allow 3 lbs. for each lb. of hay replaced. 1 lb. of grain mixture for every 3½ to 4 lb. of milk produced daily.

Concentrate mixture may be prepared as follows :

Groundnut Cake	20 parts	
Cottonseed crushed	30 ,,	
Millet flour	30 ,,	
B. G. Husk	20 ,,	
Supplement with		
Salt	2 Oz.	Per
Mineral mixture	1 ,,	animal

What licks should be provided ?

Coarse salt should always be available for the animal. When animals are fed largely on concentrates with little roughage, a sound practice is to feed salt and bone meal at the rate of 1 lb. of each 100 lbs. of body weight if concentrates are fed, add 1 lb. ground limestone where lucerne is not fed.

What common diseases might be expected ?

Mastitis is the commonest disease. It is evidenced by hardness and swelling of one quarter or more of the udder. Milk gets thickened. Hot foamentations and message are helpful but treatment by a Veterinary Surgeon is recommended. The animals should be tested against Tuberculoses and brucelloses, and positive cases dispensed with.

How should the calf be reared ?

The calf may be left with the cow as the case may be for the first day and then put with her two or three times a day for short periods so that all the milk is not taken by the calf. Alternatively, the calf may be taken off the cow and taught to drink the whole milk from the bucket 3/4 to 1 gallon per day depending upon the size of the calf. At two weeks introduce gruel hay and reduce the amount of whole milk till three or four months old, when no further milk need be given. Principally calves must be treated as individuals and fed according to their size and strength.

Grazing—Good pastures produce maximum yield of nutrients per acre. For efficient use of pasture, good supply of water, shade are necessary for proper mastication and assimilation.

Care of health and appearance.

Grooming keeps the animals more clean and healthy. Exercise is not essential for the health of milking animals since they perform large amount of work in mastication and metabolisation of the feed. The feet of the animals should be chiselled of and the hooves rasped whenever they are overgrown. Dehorning is neither practiced nor agreeable.

Common vices of Cow

Kicking is more frequently developed due to bad treatment. Tying the hind legs to protect the milk man while milking is the only way. Suckling its own milk is a bad habit and is impossible to break. Preventive methods can be tried. Fence breaking is usually developed due to poor fences. Good fencing will cure the cause. Vicious animals often attack children and adults. In early stages this can be stopped with few sharp blows on the nose, nose strings, leads etc.

Common defects in animals

Hard milkers require, more time to milk and also more energy. A delicate operation of sphinctor muscle fibre is indicated. In leaking teats, there is no known method of strengthening the teat sphinctor. The only practical way of solving is dipping the end of the teat in collodion to seal the end. Some animals have sore teats due to cold or injury. It can be treated by antisceptic ointments. In cases of warts it is better to either clip them or cauterise them.

General :— *The chief* 10 *commandments in the proper care of the cow.*

1. Use of economical and well balanced rations throughout the year;
2. Feeding concentrates to each animal to her actual production;
3. Feeding palatable rations;
4. Succulent feeds if found cheap;
5. Use laxative rations;
6. Allow dry periods of proper length;
7. Keep animals in comfortable surroundings;
8. Supply plenty of good water conveniently accessible;
9. Regularise the feed and care.
10. Have kindness.

If these single essentials are neglected, the returns will be seriously reduced.

Our civilisation would not have been what it is, but for the care of the cow and her milk. The modern cow is an abnormal animal compared to her early ancestors. Ordinarily every animal is supposed to produce enough milk required for her offspring, but due to proper care bestowed in selection, breeding, management and disease control, we have managed to produce ten to twenty times more milk during their lactation than is required for the calf. However the Indian cow has not been able to keep pace with the rapid progress the country is making. Milk, more milk, cheaper milk, hygienic and wholesome milk is the need of the day. Cow and milk deserve special care for the prosperity of the country and for building up a healthy and strong nation.

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Feeding And Rearing of Dairy Calves

by
M.R. Dasgupta

THE incentive for production of efficient dairy animals by our farmers can only be created when they are assured of the profitable disposal of their produce through establishment of regulated markets for the sale and purchase of livestock and livestock products. While a scheme for organising regulated markets in some of the states had already been receiving attention of the Government, the aim of the farmer should be to obtain maximum net returns through the sale of milk or stock backed by milk record. To this end, it is essential that the farmer should exert every nerve to build up his herd on a sound foundation of a business enterprise. His herd should be of such a standard as will stand hard competitions in the open sale yards and also fetch maximum returns for his toil and at the same time help him maintain the reputation as a good breeder.

The production of the future herd is, however, largely determined by the quality of the successive crops of heifers that enter it. This in turn is greatly influenced by their nutrition and general management from birth to calving. No matter how good its sire or dam may be, the heifer will not express its full genetic worth if in its immaturity it has been the subject to checks which have impaired its development. Good feeding in early life provides the foundation of size and constitution in livestock and without these even the most selectively bred dairy cows will be comparative failures as producers. The rearing of good heifers is, therefore, of the utmost importance on a dairy farm and should receive attention equal to that given to the milking herd if the disposal of the stock and their produce is to be effected to the best advantage of the farmer.

Feeding of Pregnant Cow is of Prime Importance

The feeding of pregnant cow during the last 3 months of gestation is just as important as its feeding while in milk. A cow which has been kept on a very low plane of nutrition during her advanced stage of pregnancy may produce a calf normal in size and weight at the expense of her own physical condition, but probably the calf will be deficient in essential minerals such as calcium and phosphorus while the dam's milk will be low in vitamin 'A' content and consequently the calf will be less resistant to scours and pneumonia.

While underfeeding of the cow during pregnancy will result in unsatisfactory progress of the calf after birth, it is not advocated that cows should be so highly fed during the latter part of pregnancy that they are in a fat condition at calving, particularly if they have to go short of feed during early lactation, as such a practice may result in troubles unassociated with calf rearing.

Handling A Newly Born Calf

A calf is best left on its mother for its first 24 hours but if the calf is weak, it should be allowed to suckle its mother for 4 or 5 days. After removal from the dam, the calf should be tethered in a dry sheltered place for several days. It is imperative that young cattle should have adequate protection against cold winds and inclement weather and it would pay to construct a small shed convenient to the cow's shed in which the very young cows could be housed during bad weather condition.

The young calf must be taught to drink from a bucket and the simplest way of doing this is to keep it without milk for at least 12 hours and then allow it to suck fingers which are immersed in a small quantity of milk in a bucket. Calves should be fed 3 or 4 times daily for the first fortnight. More frequent the interval is better for the calves, for, the young calf's stomach is comparatively small and designed to deal with only small quantities of milk taken at frequent intervals.

Importance Of Colostrum

It is advisable that for the first 3-4 days of its life, the calf should receive colostrum milk as this is nature's special provision for the newly born calf. Firstly, it has laxative properties and starts the digestive system and bowels functioning properly. Secondly, it is rich in vitamin 'A' thus giving the calf protection against infectious diseases. The normal calf is deficient in vitamin 'A' at birth but receives adequate supplies both for immediate requirement and for storage in the liver from the colostrum of the mother provided she has been fed on ample green grasses and pasture or good quality hay during pregnancy.

Colostrum milk contains antibodies transmitted from the dam's blood to give the calf some degree of passive immunity against infectious diseases particularly white scours and the action of harmful bacteria until such time as the calf is able to develop these protective bodies for itself. Finally, colostrum contains a much higher proportion than ordinary milk of proteins and minerals, such as calcium and phosphorus, required for the rapid body growth which takes place during the first few weeks of the calf's life.

Since it is very difficult to rear calves satisfactorily which have not received colostrum, the folllowing formula is useful. If colostrum is not available for any reason, a ½ tea spoonful of castor oil and an egg beaten up in ½ pint of warm water added to a pint of warm milk may be used as a substitute for colostrum and fed three times a day for the first 3 days.

Method of Feeding Milk

Milk should be fed warm immediately it is taken from the cow but when the herd milk is being fed to calves, it should be first warmed up to 100 F. When calves are 4 to 6 weeks old they can be fed cold milk without causing indigestion.

Milk from most dairy cows is richer than nature designed for the calf and it will be more digestible if it is diluted with boiled water to approximately 3.5% test. This can be done simply by adding to each 10 lb. of milk 1½ lb. of water for each 0.5% in excess of 3.5% butter fat. This practice is strongly recommended as it results in a softer and more easily digested curd in the calf's stomach.

Feeding buckets should be kept scrupulously clean or the risk of infectious scours is greatly increased. After use, they should be rinsed thoroughly with cold or tepid water then scalded with boiling water and kept in a clean, well ventilated place. Do not forget that milk is one of the most favourable medium for the growth of bacteria detrimental to the health of the calf.

The feeding of calves in troughs is very undesirable as the fast drinking calf gets more than its share of milk. Similarly feeding from bucket in the paddock is equally unsatisfactory as it involves much knocking about

the calves and the measuring of quantity is very rough. The satisfactory method of feeding will be in calf-bails where each calf is assured of its proper ration of milk and dry feed. It should be further ensured that the calves have always access to an adequate supply of clean water.

Calf Bails and Houses

As indicated earlier, individual feeding of calves is necessary to ensure that each calf receives its due share of milk and supplement and the only practical method is by means of calf bails. The use of bails, apart from providing shelter, trains the young animals for milking shed and more important still the calves can be held for several minutes after feeding and thus prevented from sucking each other.

An ideal calf house should be draught proof preferably with a concrete floor (to facilitate cleaning) covered with a clean straw or hay or a movable grating. The open part of the shed should face the sun and away from the prevailing cold winds. Divisions in the calf house should be provided to segregate the animals according to size and this will facilitate the progress of feeding. If the calves are likely to be retained in the shed for any length of time, it is a good policy to fit a series of feeding stalls so that the calves can be secured at feeding time and protected from other calves. A shed 12 ft. 6 in. by 9 ft. would accommodate at least 12 calves—the height need not be more than 6 ft. 6 in. in front.

Calves And The Feeds

The feeding of a calf will vary according to the feed stuffs available. In any case, it is essential that the calf be provided with (a) enough protein or meat forming food for the building of muscles and tissues, (b) enough energy food for the maintenance of body temperature for movement and for putting on condition and (c) enough mineral matter for skeletal growth. Furthermore, the food should be palatable, easily digestible and not too bulky or fibrous. It is also important that the best quality hay (being a richer source of Vitamin 'D') be always made available to calves and they should begin to eat small quantities at 2 to 3 weeks old, at the same time beginning to graze a little. This would induce cudding and stimulate the development of the other stomach compartments with the result, at weaning the calves receive practically no check as their digestive organs are fully developed. The various requirements are, however, considered below under the heading of different dairy by-products.

Feeding Whole Milk

Calves should be given about 1 lb. of milk daily for every 10 lb. of body weight, so the quantity will vary according to the size and breed of the cow. While a gradual increase is made in the amount fed, the aim should be to feed so much that the calf is just looking for a little more.

Whatever method of feeding is to be adopted, the feeding of whole milk is necessary at least for the first fortnight though strong, vigorous calves with care may be put on to separated milk as early as 10 days. Weak calves should be fed only whole milk for at least 3 weeks.

Feeding Skimmed Milk

The main food constituent removed from milk by separation is butter fat and to make good the deficiency, concentrates rich in starch or fat such as barley or linseed must be fed.

The change from whole milk to skimmed milk must be gradual and should be carried out during the calf's third week. It is essential to skim any froth off separated milk before feeding. Should the calf develop scours during the change, whole milk feeding should not be reverted to. The calf should be starved for 24 hours, being allowed only boiled water and given 2 oz. of castor oil. A gradual return to normal feeding should be made milk diluted with an equal amount of water being allowed on the 2nd day and on the next day, 3 parts of milk to 1 part of water.

During the 4th week, the calf should be receiving about 10 lbs. of skimmed milk daily and this should be supplemented with a small quantity of meal—about ¼th lb. The amounts are gradually increased until 3 months old each calf is receiving 15 lb. of milk and 2 lb. of meal concentrate daily. The meal is best fed dry and should be placed on the bottom of the bucket when the calf has almost finished drinking its milk ; this helps to reduce the tendency of calves to suck one another. If linseed meal is used, it should be soaked for 12 to 36 hours on cold water or boiled water until it forms a jelly to render its hard coat digestible. These meals are palatable and taken readily by calves and the choice of meal depends entirely on cost and availability. The nutritive values of the commonly used meals compared with that of skimmed milk are as under :

1 lb. of barley meal	—8 lbs	of skimmed milk	
1 lb. of linseed meal	—8½ lbs	,,	,,
1 lb. of wheat meal	—8 lbs	,,	,,
1 lb. of oat meal	—7 lbs	,,	,,
1 lb. of meat meal	—10 lbs	,,	,,

A mixture of meals is more palatable than a single meal and any of the meals mentioned may be used but if meat meal is included it should not constitute the mixture. Below is given a typical mixture :

Barley meal	—	50%
Linseed	—	15%
Wheat meal	—	10%
Oat meal	—	15%
Pea meal	—	5%
Meat meal	—	5%

The table which follows is a chart for feeding calves on skimmed mills and meal

Feeding Skimmed Milk And Meal Concentrate

Age of calf	whole milk lb.	Skimmed milk lb.	Meal lb.	Grass hay lb.	Silage or green roughage lb.
1st day	on mother				
2nd to 4th day	Colostrum 5 to 5½ lbs.				
5th to 7th day	6				
2nd week	7				
3rd week	Change to skim milk				
15th day	6	2			
16th day	6	2			
17th day	4	4			
18th day	4	4			
19th day	2	6			
20th day	2	7			
21st day	1	8			
4th week		10	¼	½	
5th week		10	½	½	
6th week		10	¾	½	
7th week		12	1	1	
8th week		12	1¼	1½	
9th week		12	1½	2	
10th week		14	1½	2	
11th week		15	2	2	
12th week		15	2	3	4
4th to 6 month		12	3	4	6-8

(*Contd. on page* 23)

A HEART TO HEART TALK BY THE CHIEF EDITOR

THE COW and MANURE PRODUCTION

NORMALLY the cow is not kept for manure only. Still the cow does provide us with the manure. In a way, the cow is just kept and not reared in the proper sense. She wanders hither and thither, goes back to the cow keeper in the evening and whatever small quantity of cow-dung is available, the farmer has to keep himself contented with that. This haphazard and unsystematic way of keeping the cow impedes the proper utilisation of cow-dung and her urine.

As for cow's urine it can be said that it is almost wasted. There is no proper method to collect urine. This has been an experience that if the urine of a pair of bullocks could be collected it could work as good manure for sizable portion of the land. There are about 7 crore bullocks in the country. According to a rough estimate their urine could provide manure for 3.5 crore acres of land.

According to the estimate of experts in this field, we get about 116 crore tons of raw manure from 20 crores of animals in our country. Out of this manure about 11 crore tons of manure is available in villages. We are not in a position to use this entire quantity. A major portion of manure is wasted. The Union Ministry of Food and Agriculture, has estimated that about 22.5 crore tons of raw dung is consumed as fuel every year. One ton of dry cow-dung is equivalent to approximately to the value of half ton of coal fuel. On this basis the value of 22,5 crore tons of raw cow-dung can approximately be that of 12.5 crore tons of coal. According to Dr. Bhabha, a prominent scientist of the country, the contribution of energy was as follows in the year 1953.

Item	*(In Crore Tons)*	*Percentage*
Coal	3.16	18.3
Hydro-electric	0.04	0.2
Oil	0.56	3.3
Wood	0.30	1.7
Dung	13.10	76.5
	17.16	100.00

Broadly speaking, the cow-dung is used as fuel in kitchens in the form of cow-dung cakes; and it is rightly said that till we make alternative arrangements of fuel for domestic consumption, we cannot force out the use of cow-dung as domestic fuel in the villages.

Let us think about the loss suffered from the economic point of view by using the cow-dung as fuel. It appears that we should be in a position to utilise cow-dung in urban areas also. There are a number of big cities in our country having drainage system and almost in all the places the urine and refuge of the city is wasted in insanitary drains. This causes not only an economic loss and wastage but pollutes the water. If this dirt of the city could be collected and put to a proper use, we could get quite a big amount of manure which could ultimately be used in our fields resulting in an increase of food production.

If cow-dung, available in villages could be properly used in villages, we can get about 30 crore tons of raw manure. In this would be 9 lakh tons of nitrogen, 4.5 lakh tons of phasphoric-pantaoxcide, 4.5 lakh tons of ammonium-sulphate and 2.2 lakh tons of phosphate. In our country, a big factory at Sindri has been established for the production of fertilisers. This factory is contemplated to produce 75,000 tons of nitrogen every year. We are thus actually incurring a wastage in terms of value an equivalent to 12 Sindri fertiliser factories, by using cow-dung as domestic fuel in our country. If this cow-dung is put to a proper use and utilised as manure, it would bring in an increase of 5 to 15 maunds of yield against one maund of nitrogen. However, there would be variations according to different other circumstances. Still, if we accept an average increase at 10 maunds even then 9 lakh tons of nitrogen would help us to increase the agricultural yield of about 90 lakh maunds.

All this appears to be very correct but the problem of providing domestic fuel cannot be over-looked. To arrange coal or any other fuel would be almost impossible under the present circumstances. It would take a long time for us when we are in a position to provide electricity in every house. Should we continue to waste cow-dung as domestic fuel and starve our fields ?

Currently important experiments are being conducted in the field of cow-dung gas. It has been our experience that normally cow-dung of only three animals for a family of 4 to 5 persons could suitably be used for a small cow-dung gas plant. Five to ten families in the village could join together and maintain the relatively bigger cow dung gas plant. They would get the necessary domestic fuel and also light. There would be an estimated expenditure of rupees three to four hundred to start with such a cow-dung gas plant. The method of operation of such a plant is so simple that a village woman can conveniently handle it.

By the wide use of cow-dung gas, we shall be having not only fuel for domestic purposes but would also get manure for our fields. It would also help in keeping the village cleaner, thus ultimately resulting in better sanitary conditions.

The dead animals

According to the census of 1956, there are

215.7 crore cows and bullocks and about 4.4 crore of buffaloes in our country. It is estimated that out of all the dead animals 8 to 10% die of natural death. The following are the details:

Animals	*Animal Death Rate Estimated (In Lakhs)*
Cattle	127.1
Buffalo	35.8
Goats	11.3
Sheep	7.7
Horses etc	1.2
Other animals	5.4
	188.5 lakhs

Our animals are mostly in villages and they die in the fields, while grazing on land etc. According to the custom the income from these dead animals goes to the village harijans. Because of the lack of knowledge, capital and other means, the dead bodies of these animals are not put to proper and fuller use. At some of the places the dead animals are left in the open and thus effect the sanitary atmosphere.

It is estimated that the carcass utilisation of the dead animals could provide us with approximately income of about 40 crores every year. But because we are not in a position to utilise the carcass properly, we incur normally a loss of about Rs 23.19 crores every year. Given below is an estimate of loss incurred in this regard:

Items	*Loss in lakhs*
Leather	423.6
Bones	271.1
Fat	423.6
Horns, hooves and teats	254.1
other items	100.0
	1472.4

If the dead bodies of the animals are put to proper use, this would bring in higher dividends. The dead bodies of the animals could be put to some of the following uses:

BONE: By removing the fat from the bone, wax, cattle glycerine and soap etc can be made out of this. The bone powder could also be utilised as feed for animals and the birds

LEATHER: By using scientific and improved methods of tanning, we can further utilise the leather.

MEAT: By treating and cleaning it chemically, this could be used for poultry.

HORNS AND NAILS: These are used to prepare glue (suresh). The horns could be used for preparing toys and other artistic material for domestic decoration.

HAIRS: The hairs of the dead animals could be used in preparing rough blankets and carpets etc.

LEVER: the lever of the dead animal could be used in preparing gut. Some elements of it could be used for manure also.

It is unfortunate that very little attention has been paid towards this important craft and industry. Not only this, the so-called upper-caste people view this as something derogatory. The more educated should take up this as any other important trade or craft.

—*Y. M. Parnerkar*

NEWS IN BRIEF

CATTLE SHOW AT BETI, RAJKOT

PROGRESS OF THE RAJKOT DAIRY

A CATTLE show was held at Beti village 14 miles from Rajkot. The participants were suppliers of milk to the Government Dairy at Rajkot. The competition consisted of :

Three best Societies that supply milk to the Government Milk Scheme. Out of 12 Societies that are supplying milk to the scheme, 9 had competed. 1st, 2nd and 3rd prizes went to the following societies :—

(a) Beti-Kuchiadad
(b) Mesariya
(c) Garida

Prizes were also given for the best milking cow and best milking buffalo. In this competition, there were over 100 entries.

Besides this, prizes were given for the 3 best Cows and 3 best Buffaloes as well as for 3 best buffalo bulls and 3 best bulls.

Shri Chhaganbhai Joshi presided. The prizes were given away by the Collector of the District Shri Chudasama. A short history of the scheme and the future plans were also explained to the gathering by Shri P. S. Medora, Regional Dairy Development Officer, Gujarat State, Rajkot.

THE Government Pilot Milk Supply Scheme, Rajkot which started in June, 1959 is at present handling about 5000 Litres of milk which is collected from 12 Milk Producers Co-operative Societies. Out of 5000 Litres of milk, 1000 Litres is Cow milk. It is not possible to meet with the increasing demand of the town although there is surplus milk in the surrounding area because of limited capacity of the plant as well as limited resources available with the scheme at the moment.

The main dairy with the UNICEF-assistance is likely to go into production in the middle of the next year. The main dairy building is nearing completion and the erection of machinery will be taken in hand in the beginning of next year. Most of the machinery has already arrived on site.

When this dairy goes into production, larger quantities of milk will be required and for this already 30 Milk Producers Co-operative Societies have been established. Furthermore 3 Chilling Centres at Wankaner, Vinchhia and Chotila are to be established in the near future.

An Inspiring story of a co-operative farming society

A DYNAMIC PROJECT TO REHABILITATE THE COWS IN NORTH GUJARAT

North Gujarat is famous for its Kankrej breed of cows. Here the nomadic cattle breeders through their excellent husbandry practices have been successful in combining both the qualities of draught and milk in one breed to an appreciable extent. Till sometime ago, these herdsmen were depending upon the available grazing for the feeding of their stock. At present almost all the grazing areas are under cultivation; and this has affected adversely the feeding resources. Consequently, the cows are left almost in a semi-starved state and this is resulting in the depletion of good-quality stock rapidly.

The Paradox

The cultivators are keeping buffaloes, taking into consideration the high percentage of fat, which compared with cows, pay them higher returns. It is more economical to them to purchase bullocks rather than to keep cows and rear bullocks. Moreover the prices of bullocks are going very high day by day and it has become rather difficult to get good bullocks at reasonable cost.

There is no more land left to rehabilitate the Kankrej cattle breeders on land. The way only left is to rehabilitate the cows with farmers on mixed farming pattern.

An Experiment—The Beginning

Confronted with the vital task of the rehabilitation of the cow, a dynamic and inspiring experiment to solve the problem on solid and permanent footing was launched in North Gujarat. The initiative came from the people. A couple of persons joined hands together to tackle this problem by initiating a co-operative venture. Thus was born the Panetha Co-operative Farming Society in 1950 which was formed in an inconspicuous place Panetha on the river Narmada in Broach district, which has now, through its progressive approach, not only made its existence felt all over the State of Gujarat but has also created a deep impact on the gigantic problem of the rehabilitation of the cow in that area.

The society was registered in 1950 with 27 members and 125 acres of bet-land in the river-bed. Sixty-five acres of land is cultivated after monsoons are over and **Jowar** *and* **Val** *are grown which are useful both as fodder crops and food grains. Sixty acres of land is kept with natural*

grasses. After the grasses are cut, it is used for grazing. The members were initially keeping buffaloes.

Replacement of Buffaloes by Cows

With a view to find a way out for preserving Kankrej cows, Gujarat Goseva Sangh persuaded the members of the Society to keep cows in the year 1955. As a result each individual member purchased one cow. In all twenty seven cows were purchased from North Gujarat. At present, there are thirty-nine members who have purchased thirty-three cows at a total cost of Rs 5947/-. The average purchase-cost had come to Rs 150/- per cow. These cows were average and medium types of cows and not of high yielding capacities.

Progress of the Project—At a Glance

Given below are the figures worked out from the data that could be available from the records of the last five years of working :

YEAR	'55-56	56-57	57-58	58-59	59-60	60-61	*Total*
Members	29	32	39	39	39	39	
Cows	27	27	27	34	34	42	
BIRTHS							
Male	7	8	9	10	8	11	53
female	9	6	7	6	7	9	44
							97

Cows purchased	33	*Female calves born*	44
Cows died	—7	*died*	—3
Cows sold	—2	*sold*	—4
Heifers calved	+18	*Heifers calved*	—18
Present strength	42	*Present strength*	19

Male calves born	53
died	— 6
sold	— 7
working bullocks	—23
Castrated males and sucklings	17

Present strength

Cows	42
Female calves	19
Working bullocks	23
castrated males and male calves	17
rearing bull	1
bulls in service	2
Total	104

Interval between calvings—15 *months to* 24 *months*

It has been observed that approximately 50% cows remain in milk and 50% remain dry. Average dry period remains 4 to 6 months. Male calves are generally given two teats to suckle and if the cow is below average the male calf is allowed to suck three teats. The female calf is given one to two teats. The general practice is that whatever milk is required for home consumption is secreted and the remaining milk is allowed to be sucked by the male calves. When the cows were purchased they were yielding 4 to 5 lbs of milk per day after suckling. At present, the same cows are yielding on an average 6 to 9 lbs of milk per day. This is due to better management and feeding provided.

The Milk Yield

Milk is not sold. Cow's milk is used for home consumption and the buffaloe's milk is used for ghee-*making. Out of thirty-nine members, sixteen members have dispensed with buffaloes and are keeping cows only.*

The local cows of Broach district yield 1 to 4 lbs of milk per day, whereas Kankrej cows yield 6 to 9 lbs per day.

Rehabilitation of the Cow is a challenging task. It requires vigorous efforts. The story of the Panetha Cooperative Farming Society, North Gujarat is symbolic of the zealous spirit of the people to tackle this problem on a solid footing.

Bullocks from the local cows fetch about Rs 300/- per bullock, as against the price of Rs 600/- realised per bullock from the Kankrej cows.

Sale of animals	Price realised (Rs)	Average per animal (Rs)
Cows—2	340	170
Heifers—4	715	179
bullocks—7	3620	517

Keeping of Cows by Non-members

Realising the benefits that were derived by the members of the society in keeping cows, the other farmers in the village were also tempted to keep cows. Now about twenty cows are being kept by non-members also. The non-members are encouraged in keeping cows by being provided with facilities of grazing and free service of the bulls. The members and non-members are charged nP 25 to nP 30 per cow per month for grazing facilities. The non-members are given preference in the purchase of grasses, produced by the Society.

The society at present is keeping two pedigree bulls and rearing one bull and is providing free service of the bull to the outside cows.

Advantages of Keeping Cows:

By keeping cows they have derived the following advantages.

(i) *They are consuming all the cow milk they get from the cows. This has obviously resulted in the improvement of their own health.*

(ii) *They have not to purchase bullocks from the market at a very high price. Home-bred bullocks give more work than those that are purchased.*

(iii) *The prices of the heifers are higher than the purchased cows*

(iv) *Their agriculture has improved with good cultivation which is evident from the following statistics in respect of agriculture.*

Agricultural Production:

Year	51-52	52-53	53-54	54-55
Production in Rs	7928	25625	20876	19170
55-56	56-57	57-58	58-59	59-60
24376	21867	24713	24247	16380

Money Spent on Land Improvement:

	Loan	*Subsidy*	*Total*
1956-57	3000	1000	4000
1958-59	2400	600	3000
	5400	1600	7000

Other Activities of the Society:

The Society has sunk one well at a total cost of Rs 5000/- It has erected an engine and pumping set at a cost of Rs 16000/-. The under-ground pipe-lines are being laid in for the extension of the irrigation facilities.

—*M.S. Trivedi*

RS. 90 CRORES FOR ANIMAL HUSBANDRY IN THIRD PLAN

SHRIMAN NARAYAN INAUGURATES VETERINARY CONFERENCE

INAUGURATING the Fifteenth Indian Veterinary Conference in Mathura on the 29 Jan. '62 Shri Shriman Narayan, Member, Planning Commission, said that as against an expenditure of about Rs. 32 crores during the Second Plan, the Third Plan had provided Rs. 90 crores for animal husbandry and dairy development programmes.

Expressing disagreement with the view that in India the bullocks could be dispensed with for agricultural purposes by persuading the Indian farmer to use modern machines and tractors, Shri Shriman Narayan said that economic studies and researches throughout the world had shown that machines and tractors could increase the productivity per unit of labour but not per unit of land. The machines could be utilised for reclaiming waste lands but as there was little scope now for reclamation in our country, the main problem was to intensify the agricultural processes and that called for chemical rather than mechanical devices. It was therefore, essential, he said, to utilise our existing animal and human resources to the full before thinking of introducing large-scale mechanisation in the sphere of agriculture.

Animals, specially cows, would therefore remain for many years to come the true friends of Indian peasants, he said. But as India was already over-populated, she could not afford to maintain two sets of animals, one for milk and another for draught purposes and evolution and development of "dual-purpose" cattle in various parts of the country was necessary. Since cow alone could be used as a multipurpose animal in India by the rural population, it was imperative to take special care for her welfare and development, he added.

He pointed out the need for linking up the dairy schemes in bigger cities with the collection of surplus milk from rural areas through co-operative societies and said that this would enable the cattle to live in the natural surroundings and also serve as a source of supplementary income to the farmer. Even the bigger dairies in Delhi, Bombay, Calcutta and Madras had been asked to reorganise their production and distribution that way, he revealed.

Since without the production of adequate fodder for cattle it would not be possible to improve their quality, he suggested the establishment of a number of forage demonstration blocks in villages, distribution of planting materials, conservation of surplus fodder through ensilaging and adoption of improved agricultural practices. He disclosed that as in periods of scarcity fodder banks would have great utility, besides one such bank established during the Second Plan, two more fodder banks were to be set up during the Third Plan period. A Forage and Grassland Research Institute would also be set up, and suitable areas selected in different States for the development of mixed farming so that the requirements of both food-grains as well as fodder might be adequately met.

Referring to the problem of surplus and stray cattle, he said that schemes in that regard had to take note of the strong sentiment in the country against cow slaughter. It was, therefore, essential to prepare schemes for Gosadans and work systematically for their success. He disclosed that in the Third Plan it was proposed to set up 23 more Gosadans in addition to 59 already established during the last decade.

Shri Shriman Narayan stressed also the importance of improving the administration of Agriculture and Animal Husbandry Departments in the states and hoped that the state Governments would pay attention to that.

TRACE ELEMENTS IN ANIMAL NUTRITION

by : **B.N. MAJUMDAR**

WHEN man domesticated animals one of the criteria he considered is their usefulness. The utility of the animal species has determined its value as an adjunct to better living. Thus, at one stage of our civilization we find that the animals, particularly the cattle, formed the wealth of the kings and their serfs. Not only these have served to sustain and nourish man's life they have also been used as barter for exchange of articles and things. Naturally, their feeding and care became a matter of necessity for his own survival. To derive the maximum benefit out of them they have to be more adequately fed and properly maintained. Slowly the science of nutrition developed. It has shown us that for the health and productivity of animals we have to feed them on adequate levels of nutrients and in certain proportions of protein, fat, carbohydrates, calcium and phosphorus. As our knowledge enlarged further we have come to recognize that important though these nutrients are their utilization is impaired in the absence of certain accessory food factors, called the vitamins, and trace minera's. Not only that, life itself cannot continue in their absence. Since long chemists and natural scientists have proved the existence in nature of a large number of elements of which some are present in traces. These latter elements are called tr ce elements. Nutritional scientist has used the term to connote a mineral element which is present in the plant and animal tissues usually at a level of between 1 and 50 p.p.m., and although some 40 such elements answer to this description for practical animal husbandry purposes the importance of only seven of them has so far been recognized. These are iron, copper, cobalt, manganese, zinc, iodine and fluorine. Two more elements e.g., molybdenum and selenium are also listed in this group but they are better known for their toxicity.

It has been demonstrated, in some cases conclusively, that these elements are not only present in plant and animal bodies in minute traces but they are also essentially needed in such traces by the animal organism to maintain its life and perform certain essential functions like growth, reproduction, milk, wool and egg production. Thus, even when an animal is maintained and fed well on adequate or more liberal levels of the other known nutrients and vitamins, a short supply of one or another of these trace minerals is enough to cripple the animal for any productive purpose.

The essential nature of iodine and its association with goitre has long been known. Even as early as 1914 McCarrison in India related the incidence of goitre, among other causes, with a deficiency of iodine and studied its regional distribution in human beings. But it is only during the last 25 years or so pathological signs and symptoms due to the deficiencies of copper, cobalt, manganese etc. have been discovered and animal husbandry has thereby entered into a new phase. Large areas in Australia, New Zealand, Florida in the U.S.A. and parts of Scotland, which at one time were found to be unsuitable for livestock farming, have now been fostering a flourishing animal industry. This has been possible due to the surveys conducted of the soil, feeds etc. and recognition of the part played by a deficiency, or sometimes an excess, of one or another of these trace elements. Thus, copper deficiency in cattle and other ruminants has been found to lead to a decrease in the growth rate; the coat becomes harsh and lustreless. Dipignentation of the hair, goggled eyes and abnormalities in wool growth are also noticed in the sheep. Anaemia is common and so is a disturbance in the reproductive function of the animal. The incordinated movement of the limbs, staggering, falling and instantaneous death, especially in lambs, seen in Australia and New Zealand has been attributed to copper deficiency and this condition has been called *enzootic ataxia* there and 'Swayback' disease in the U.K. A similar deficiency of cobalt leads to a loss of appetite and progressive emaciation. Although anaemia is mainly the result of iron deficiency, copper and cobalt have also been found to play a major role in the formation of blood. A lack of manganese in the diet, on the other hand, produces perosis or a shortening of the leg bones in the chick. However, the main role that a deficiency of this min ral plays in the animal body is in the development of sexual activity. Its deficiency causes a degeneration of the male and female reproductive systems. Zinc and fluorine too have their parts to play. On a nearly zinc-free diet growth and development of fur in the rat—and perhaps in other animals also—are interfered with, while fluorine prevents dental caries and tooth and bone decay. Recognition of this latter fact has led to a legislation in the U.S.A., whereby it has been made compulsory to add a little quantity of fluorine compound in the drinking water supplies of areas where such tooth anomalies are rampant. However, the major role that fluorine plays is in its chronic toxicity which results when the concentration of this mineral in the drinking water exceeds 1 p.p.m. Similarly, as little as 8.5 p.p.m. of salenium and 10 p.p.m. of molybdennum may cause conditions known as alkali disease or blind staggers and teartness. The former is caused by an excess of selenium and is characterized by a loss of hair from the mane and tail in the horse and tail in the cattle, a sloughing off of the hooves and lameness, and the latter, an induced copper deficiency and diarrhoea condition, is caused by molybdenum excesses.

In the case of copper and cobalt, it has been stated that when the content of minerals in the pasture or forage falls below 7 p.p.m. in the case of copper and 0.04 p.p.m. in the case of cobalt a deficiency of the one or the other may be expected. Iron, manganese and zinc are plentifully available in feeds and their deficiency is uncommon.

Pathological conditions associated with a deficiency of these minerals are well established. However, such characteristic symptoms of frank deficiency are seldom seen. On the other hand, non-specific signs and symptoms like general unthriftiness, late maturity, low milk yield, long intercalving period etc. are common and these have for long agitated the minds of the animal husbandry workers and nutritionists in India. As a result, during the last decade or so especially, extensive use of trace minerals mixture in farm feeding practices has been resorted to. It cannot be said that this has proved beneficial in all cases but the idea has gained ground that these conditions are in some way the result of a deficiency of one or another of the trace minerals in the mixture supplement. As a matter of fact, an experiment conducted under the auspices of the I.C.A.R. at the Military Dairy, Bareilly has shown that the supplementary feeding of a trace mineral mixture to milch buffaloes resulted in a significant increase in the milk yield and it was economically sound.

Extensive surveys carried out by the animal nutrition division of this Institute have shown the widespread existence in the country of copper deficiency of a sub-acute type. Fluorosis zones also have been mapped out. Cobalt deficiency or molybdenum excess was nowhere seen. On the other hand, excessive manganese feeding was more in evidence. This was more especially noted in paddy straw areas, paddy straw being a rich source of this mineral. The animals there are also often unthrifty. What part this high ingestion of manganese plays is not known. No doubt, the trace minerals are extremely valuable for raising livestock but it would be well to caution that in large doses they may be toxic. A case in point is iodine, which in small doses prevents goitre but when fed in excess may cause incalculable harm to the health and productivity of the animal.

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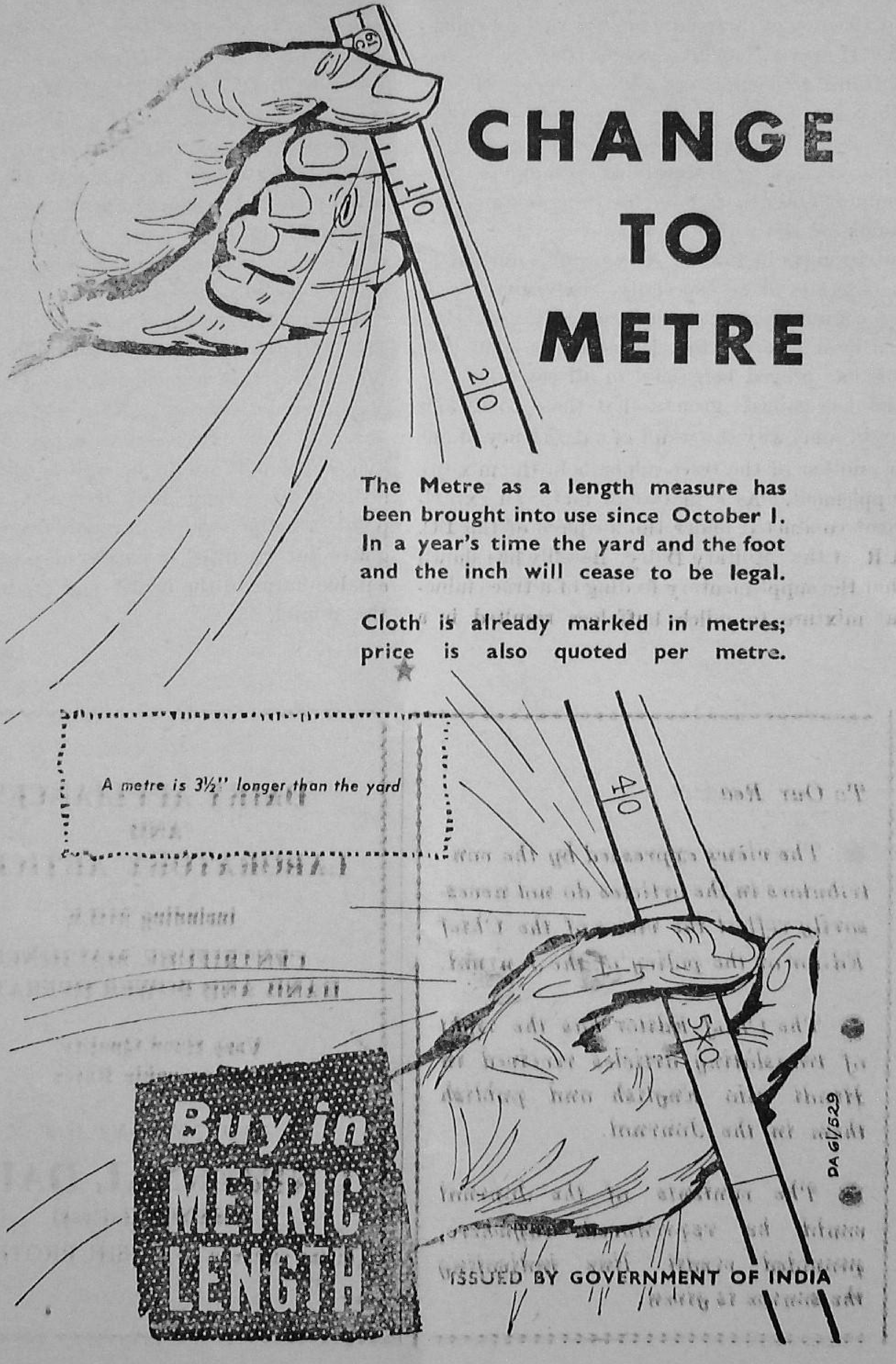
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FEEDING AND REARING OF DAIRY CALVES

concentrates. The quantities given are suitable for an average Hariana calf of about 50-55 lbs. body weight, but the feeding charts should not be rigidly adhered to. Calves are individuals varying in their ability to digest food and the best measure of the quantities to be fed is the progress and physical development of the calf. The accuracy with which these can be judged is one criterion of the good stockman. The cost of raising a calf as per the feeding schedule up to 6 months' age comes to Rs. 234/- which will however vary according to local conditions.

Feeding Whey

Whey has a very different composition from whole milk. It is minus the fat, a large amount of the protein and some of the mineral matter. The loss of protein which goes into the curd renders whey deficient in flesh forming materials and so it has to be supplemented with protein-rich food. It is also necessary to supplement the mineral content of whey.

The most suitable concentrate to meet this requirement is meat meal. But this is unpalatable to calves and it will give better results if mixed with barley oat or linseed meal in the proportion of 1 part of meat meal to 2 parts of cereal. When meat meal is fed, it should be pure meat meal i.e. not meat and bone meal and it should be fairly free of hair and fibre. A suitable and simple mineral mixture is that of salt and steamed bone flour in equal parts and fed @ 1½ oz. per gallon of whey. Whey should always be warmed to blood heat for feeding i.e. 98° F—100° F.

Greater care must be exercised in changing from whole milk to whey feeding. It should be done gradually, preferably taking 2 weeks to complete the change as a sudden change is likely to cause an outbreak of scours. Boiling milk before mixing it with whey is advisable to prevent coagulation and if whey has to be kept for some time before it is fed to calves, it should be boiled to check acidity. Below is given a feeding chart for feeding calves on whey and meal concentrate but the amounts fed must be varied to suit the needs of individual calves. The cost per calf up to the age of 6 months is approximately the same as has been indicated under the previous schedule of feeding.

Feeding Whey And Meal Concentrate

Age of calf	whole milk (lb)	Whey (lb.)	Meat Meal Mix. (oz.)
First 2 weeks	Normal feeding		
15th day	7	1	1½
17th day	6	2	2
19th day	5	4	3
21st day	4	5	4
23rd day	3	6	5
25th day	2	8	6
27th day	1	10	8
5th week	—	11	10
6th week	—	12	10
7th week	—	12	12
8th week	—	14	12
9th week	—	14	16
10th to 12th week	—	15	16
4th to 6th month	—	12	12

So far as the roughages are concerned, the figures remain the same as under the schedule of "skim milk feeding."

Feeding Dried Butter Milk etc.

Dried butter milk powder is uniform in nutritive value and is suitable for calf feeding where only limited quantities of whole milk are available.

To prepare the dried butter milk or dried skim milk for feeding, mix 1 lb. of the powder with a small quantity of cold water and stir to make a smooth paste breaking up all lumps. Add hot water to make 1 gallon and stir thoroughly. It should be fed to calves at 100F.

The powdered milk is usually supplemented with cereal meal and meat meal. Since use of dried butter milk or skim-milk as a feed for calves is an expensive proposition, it is desirable to wean the calf as early as possible and this can usually be done when the calf is 10 to 12 weeks old. It should be fed 3 lb. of meal concentrate daily from weaning until it is 5 months old.

The early weaned calf has to rely a greater degree on concentrates for nutrition and for this reason a meal mixture is preferable. A suggested formula is given below which can be varied according to circumstances :

Crushed oats	—	40 lbs
Barley meal	—	40 lbs
Butter milk powder	—	20 lbs
Steamed bone meal	—	½ lb
Ground limestone	—	½ lb
Coarse salt	—	½ lb

Rearing on Limited Whole Milk

There may be instances where either separated milk or other by-products are not available. Under such conditions, calves can be reared successfully on a minimum of whole milk until 18 weeks of age or older.

The calf is fed in usual way for the first 4 weeks—on the mother the first day, mother's milk until the 4th day and thereafter whole milk at the rate of 1 lb daily for every 10 lb of body weight. From the 5th week, decreasing amounts of whole milk are fed and the calf is weaned at 3 months. The following daily quantities of whole milk are recommended :-

To the end of the 1st week	:	6 lbs
,, ,, ,, 2nd ,,	:	8 lbs
,, ,, ,, 3rd ,,	:	8 lbs
,, ,, ,, 4th ,,	:	9 lbs
,, ,, ,, 5th ,,	:	8 lbs
,, ,, ,, 6th ,,	:	7 lbs
,, ,, ,, 7th ,,	:	5 lbs
From 8th to 10th weeks	:	4 lbs
,, 10th to 12th weeks	:	2 lbs

From the end of the 2nd week, warm water should be added to bring the total volume fed per day upto 1 gallon. By this method a calf can be reared on less than 48 gallons of whole milk. In this method of rearing the provision of the best-quality hay (preferably leguminous) and good green grasses is particularly important. A good supply of clean water should invariably be provided for the calves.

The cost of raising a calf under this method of feeding at the age of 6 months will be in the neighbourhood of Rs. 170/-.

Treatment After Weaning

Since weaning time and immediately subsequent is a very critical time with a calf it should undoubtedly receive preferential treatment. It is also advisable that the weaning age (although variable) is not earlier than 3 months and the calves are weaned on high quality green grasses and pastures. Because the heifer calf is not a producing animal, it should not be used as a follower and denied decent grasses and pastures. On the contrary, it should be given the consideration its juvenile state demands. When pasture is not good through drought conditions, a little green lucerne is very useful. When supplementary feeding is necessary it is important that the hay and ensilage is of good quality. Lucern hay is particularly good as it is so rich in lime.

At 4 months old, the ruminant stomach is fully developed and the grazing habit is well established so that the calf has an increasing need for pasture. Calves are by nature selective grazers and will soon eat out the most palatable areas of grass in a paddock leaving what appears to be ample good feed but what is in fact too rough and unattractive for their fastidious taste. That is why the calves should be rotationally grazed and preferably 7 or 8 paddocks ought to be available for the calves which should never be left on a single paddock for more than 5 days or so. Keeping the calves on one paddock for long periods—increases the risk of severe worm infestations because of the calf's resistance to worms infestations because of the calf's resistance to worms being lowered by undernourishment and because of heavy contamination of the pasture with worm eggs.

When clean pasture is not available and the winter is the worst, a small amount of concentrate feeding—say one pound per calf per day, is a very good insurance against an excessive loss of condition.

In conclusion, it is emphasised that *there is a compromise between what feeding is desirable and what is practicable. As with any feeding guide, no hard and fast rules can be laid down. The feeder has to use his own judgement in individual cases. The calves which are small for their age should be fed less, and calves large for their age more, than is shown for the average calf in different feeding schedules.*

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An Outlook On

VETERINARY TOXICOLOGY IN INDIA

by

S. S. NEGI

INDIA is one of the countries where criminal poisoning of animals is committed The crime is committed by the professional sect of skinners, for the sake of the hides of the dead animals. The poisons employed to destroy cattle are often arsenic, *a brus prectorius*, yellow oleander and sometimes aconite. Arsenic may be administered to the animals mixed with the normal feed material but sometimes a bamboo *sui* (needle) is contaminated with arsenic paste and thrust into the tongue of the animal. The other cattle poison which is reported to be commonly used in the form of *sui* is the one prepared from the seeds of *abrus prectorius*. The seeds are softened with water and ground to a paste to roll into the form of a *sui* which is driven into the flesh of the animals. To enhance the fatal effect *suis* are sometimes made with the milky juice of *calotropis gigantica* (*Madar*) instead of water. Metallic mercury, *dhatura* and aconite are also occasionally incorporated in the paste from which the needles are prepared. Other poisons that are used in this country include *strychnia*, morphia, cocaine, plumbago and hemp. Occassionally copper, lead and phosphorus are also used.

No statistics is available to show the magnitude to which such crimes are perpetuated in the present day but very often one comes across reports of such evil practices mainly indulged in for the sake of hide flaying. There is no doubt that innumerable cases of stock poisoning do occur whether due to design or accident. The substances that are used in criminal poisoning of animals may be organic in nature and might in most cases be of plant origin as in the case of cattle poisoning with *abrus prectorius*, oleander, aconite *etc.*, but arsenic, lead and other metallic compounds have been equally incriminated in cases of accidental or criminal poisoning of animals. Metallic toxic elements like selenium that are absorbed by selected plant species may through the ingestion of such plants by livestock also cause considerable damage. The incidence of plant poisoning can, however, be considerably reduced by suitable range management.

The problems confronting the veterinary toxicologist, which though not of a strictly forensic nature, are however, continually on the increase in the industrialised countries. The new problems arise from the increasing use of modern chemicals in agricultural practices without full realisation of the attendant hazards. The experience in agriculturally advanced countries has been that most cases of livestock poisoning due to toxic chemicals used on the farm have been due to ignorance and carelessness on the part of man. In the wake of industrialisation of the country and the introduction of modern methods in agricultural and animal husbandry practices, India has to be on the alert. She must take a timely note of the situation that may arise. When cases of poisoning of livestock on the farm due to ignorance and negligence in the use of chemicals in agricultural practice are of frequent occurrence in advanced countries, the incidence of livestock poisoning from such use of chemicals on the farm is bound to be much higher in a backward country like ours, where amongst masses carelessness in handling of dangerous drugs has to be typical of the illiterate.

While the general mass of the people is not enlightened enough to fully understand the serious implications of the careless use of such chemicals, as rodenticides, fungicides, insecticides or weed killers, we do not as well have adequate means for dissemination of knowledge with regard to the intelligent use of these chemicals.

Arsenic is very widely used in insecticidal or herbicidal preparations. Pastures and grazing lands may prove poisonous to animals following arsenical sprays. Arsenical dips for sheep and cattle also require a careful handling lest the stock are accidently poisoned. Copper containing fungicides sprayed in orchards may be the cause of copper poisoning of animals. Copper toxicity incidents may follow the careless drenching of sheep for treatment of stomach worms and the use of unevenly dispersed copper additives to calf or pig meals. There is a possibility of cases of fluorosis amongst animals being constantly on the increase because of the contamination of herbage and soil from fluorine containing particles and gases emitted out from the ever increasing number of chimneys of steel and other industrial works. The incidence and the severity of such chronic poisoning resulting in livestock in industrial areas may require frequent assessment with a view to undertake appropriate measures for mitigating the ill-effects.

In countries where the use of sulphaquinoxaline as coccidiostat in poultry is very common, poultry suffer from a haemorragic condition. Investigations are needed to suggest measures for avoiding sulphonamide toxicity before popularising the use of such drugs in this country. The new rodenticides such as fluoroacetate, warfarin and zinc phosphide are efficient rat poisons but their accidental ingestion by farm animals may lead to toxicity and consequent loss of livestock production. The organomurcuric compounds used as fungicides in horticulture and dressing of seeds are dangerous for both animals and human beings. The veterinary toxicologist has to be particularly on the guard as very often the surplus dressed seed is incorporated in concentrate mixtures for farm animals. Elaborate investigation are called for before suitable advice can be tendered with regard to the safe use of different mercurical compounds.

Phenothiazine used for the control of the internal parasites of farm animals is not without attendant hazards of photosensitization of treated animals. The insecticides belonging to the group of chlorinated hydrocarbons, such as D.D.T., aldrin, dieldrin, B.H.C., heptachlor etc, used as sprays, dips or dusts are very efficient for the control of ticks, mites, lice etc., but are very highly poisonous to animals if not used carefully. The insecticide residues in feeds and fodders when ingested by animals may cause acute or chronic poisoning. The problem has also an importance from the public health point of view as the insecticides may be stored in the body fat and retained there for lengths of time depending on the type of the compound, the quantity ingested and the state of the animal. The insecticide residue storted in the body fat of the animals may be indirectly ingested by human beings through the meat of such animals. The question of their secretion in milk or incorporation in eggs is of importance since considerable quantities of insecticides ingested through feeds may be so excreted exposing the suckling animals or the human beings utilising these products to considerable hazards while the animals or birds consuming the feeds containing the insecticide residues may remain quite safe. Not much is known about the toxicity of these various compounds for the different classes of animals. The results obtained elsewhere with regard to their toxicity cannot be accepted without resservation as there is evidence that batches of these insecticides prepared at different times under different conditions may differ in their toxicity.

The organo-phosphorus insecticides such as parathion, malathion etc., are useful against many insects which have developed resistance to chlorinated hydrocarbon insecticides. Extra care is needed in handling and spraying of these materials in agricultural and horticultural operations. The toxicity for farm animals of such compounds requires assessment from the point of view of finding means of relieving the distressing symptoms developing in animals following their exposure to these compounds. Besides steps are needed to guard against the exposure of stock to herbicides and weed killers on sprayed land and crops. It appears that the use of hormone weed killers promotes conditions that lead to accumulation of nitrates in some plants, the ingestion of which by animals may be dangerous.

In spite of their toxicity all these new products are extemely important in agricultural and public health operations. The all round planned development of the country under the consecutive Five Year Plans necessitates the ever wider use of these products. ●

CHARACTERISTICS OF RATHI CATTLE

'The animals of this breed are concentrated in the area known as the "Rathi Tract" which comprises of a part of Bikamer, Ganganager and Jaiselmer districts of western Rajasthan. The breed is a mixture of Sahiwal, Sindhi and Hariana, and, therefore, it should be able to do fairly well in most parts of the country'

by

S. P. OHRI

SAHIWAL, Sindhi, Gir and Deoni are the recognised Indian breeds of milch cattle. Hariana, Tharparkar, Ongole, Gaolao, Krishnavalley and Kankrej are regarded as dual purpose breeds. The Rathi breed of cattle is not yet recognized by the Indian Council of Agriculture Research. The animals of this breed are concentrated in the area known as the "Rathi Tract" which comprises of a part of Bikaner, Ganganagar and Jaisalmer districts of western Rajasthan which has got a rainfall of 10-20 cms. per year and temperature ranging between 34° F and 120° F. The cattle population in this tract is about two and a half lakhs. The breed is a mixture of Sahiwal, Sindhi and Hariana breeds of cattle with a predominent trend towards Sahiwal. Most of the animals are owned and bred by Nomads in semi-wild condition who keep their herds moving in the tract according to the availability of water and grazing. The individual Nomad family generally owns more than hundred animals on an average and due to the sale of milch cows and ghee, they are fairly well off financially. The Rathi animals have most of the characters of Sahiwal and Sindhi breeds ; they therefore hold very promising future in establishing good dairy herds of upgraded Rathi animals by cross breeding with Sahiwal and Sindhi males. As most of the areas of Sahiwal and Sindhi animals have gone to Pakistan and our cattle development work has been handicapped for want of good milch animals to form basic herds, it is essential that these animals should be upgraded. Being essentially a mixture of the three above mentioned breeds, Rathi animals should be able to do fairly well in most parts of the country .

As no authentic literature or information was available about Rathi cattle the following study was undertaken in a Dairy herd comprising of 46 cows and 47 calves of different age groups at Rajasthan College of Veterinary Science and Animal Husbandry, Bikaner. The adult cows had been purchased from the Rathi Tract. The present study was limited to red animals as the policy of the college is to have animals of red colour for crossing with Sahiwal bull. In the Rathi Tract however,

most of the animals are of various shades of red, fawn, red with white patches and black with white patches. Animals of pure grey or black colour are very rare.

Rathi breed of cattle is a medium heavy breed with symmetrical body, broad head (except a few who have Hariana head), short horns and fine loose skin. The female has the general appearance of good milch animal. In the male, the hump is of considerable size, the dewlap is voluminous and sheath pendulous.

CHARACTERISTICS

Head:

Forehead : Medium size and lean.

Face : Broad between eyes and slightly dished.

Muzzle : Broad, not coarse, with wide open nostrils, jaws strong.

Eyes : Mild, full and placid.

Ears : Medium size and more or less dropping.

Horns : Short and generally do not exceed 3 or 4 inches in length.

Body and Limbs:

Neck : Lean and long, with clean throat.

Dewlap : Fine and loose.

Chest : Broad, deep between and just back of forelegs.

Legs : Proportionate to size and of fine quality with good feet.

Shoulders : Light, well set but thin at withers.

Barrel:

Back : Straight and strong, level along tail-head.

Ribs : Amply sprung and wide apart, giving wedge shape.

Navel-flap : Prominent in female.

Sheath : Loose and pendulous.

Hind quarters:

Loins and hips : Hip bone high and wide apart. Loin broad and strong.

Rump and pin bone : Rump long to tail setting and nearly level between hip bones. Pin bones wide apart.

Tail : Long, fine, tapering to a good black switch well below the hock (in partially coloured animals tapering to a white switch),

Udder : Well developed, firmly suspended from the body without deep cuts. Teats of good length. Milk vein prominent.

Skin and hair : Loose mellow with fine short hair.

The measurements of Rathi animals of different ages and the comparison of its adult female with that of Sahiwal female are given in Table I.

DISCUSSION

A study of Rathi animals maintained at Rajasthan College of Veterinary Science and Animal Husbandry, Bikaner was undertaken in order to judge their suitability for grading them up with Sahiwal male. The study clearly indicates that Rathi animals are physically very suitable for upgrading by Sahiwal. The striking difference in weight appears to be due to the fact that the average weight recorded of Rathi animals is of purchased stock, whereas that of Sahiwal is of farm bred which are always well looked after and properly fed. The result of first cross between Sahiwal male and 23 Rathi cows has been very encouraging as far as their colour is concerned and almost 100% progeny have been of red colour. The production record of 27 animals which have completed one lactation is given below :

Production record of Rathi Cows.

Highest milk yield	5686 lbs
Average daily yield based on monthly average	11.1 lbs.
Highest average	12.6 lbs.
Highest daily yield by best animal in the herd ever attained.	19.0 lbs.
Average lactation yield	2919 lbs.
Average days in milk	354.5
Average dry days	173.6*
Lowest yield	1805

* Average dry days figure is questionable as for some period there was no male in the herd.

TABLE I

Average Measurement in Inches.

Number of animals studied	30	30	48	35	28	27	21	48	
Age	At birth	One week	One month	Three months	Six months	One Yr.	Two Yrs.	Adults Rathi	Adult Sahiwal
Height behind hump.	27.0	29.3	29.5	33.9	38.0	45.5	47.2	49.6	48.7
Length from points of shoulder to pin bone.	23.0	24.0	25.5	32.0	38.0	42.0	46.5	52.6	56.3
Length of quarter from angles of hip to pin bone	8.0	8.3	9.0	10.5	12.0	15.0	15.5	16.0	17.7
Height at angle of hip.	27.0	28.8	29.5	33.4	37.0	45.5	45.8	46.5	48.4
Width between angles of hip.	5.0	6.3	6.8	9.0	10.7	14.0	14.4	16.1	18.0
Height of pin bone.	23.0	25.3	26.9	31.5	34.5	40.5	41.1	43.1	43.4
Length of tail and height	16.5	18.0	19.3	23.6	29.0	36.0	45.1	45.9	40.0
of end of switch from ground	9.5	9.8	10.5	9.9	10.5	8.0	2.5	1.5	5.5
Girth.	24.0	26.5	30.5	33.4	42.0	56.0	61.0	64.2	67.6
Height at point of elbow.	16.0	17.3	17.5	19.7	21.5	24.0	24.9	25.6	27.1
Measurement of bone from knee.	9.5	9.8	10.0	11.2	12.0	12.3	12.9	13.0	7.7
Length of face from occipital crest to upper edge of muzzle.	9.0	9.5	9.6	11.1	13.3	17.5	18.4	19.5	19.9
Width of face immediately above eyes.	4.5	5.8	6.0	7.2	7.5	7.6	7.8	7.9	8.0
Length of lower surface of ear measured from tip to junction of ear to face.	6.0	7.3	7.4	7.8	9.2	10.0	11.1	11.3	11.0
Greatest width of ear.	3.5	4.0	4.0	4.2	4.9	5.5	5.8	5.9	4.5
Slope of rump i.e. height to hook bone minus height to pin bone.	3.0	3.5	3.7	4.6	5.0	5.5	5.6	5.8	5.0
Weight (pounds).	42.6	58.0	85.2	158.3	235.0	485.0	627.5	650.8	9.0

The comparison between the milk of Rathi cow and that of Sahiwal is given in Table II and Table III shows the comparison between the colostrum of the two breeds.

TABLE II

Composition of Milk (percent)

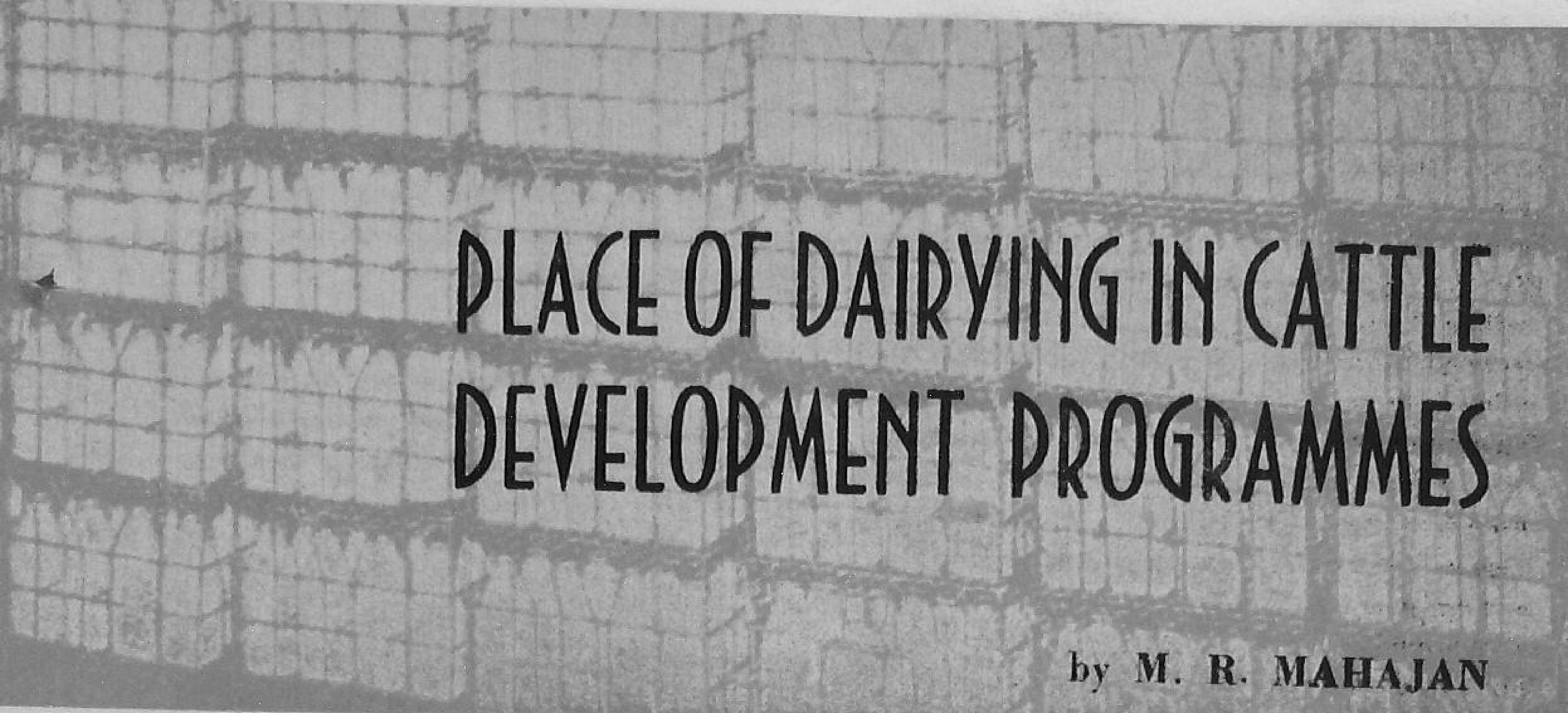
Breed	No. of samples tested	Sp. Gr. at 60° F	Total solids.	Fat.	S.N.F.	Protein	Lactose	Ash.	Water
Rathi	80	1.029	12.852	3.97	88.8	3.974	4.58	0.72	87.13
Sahiwal	134	1.032	13.85	4.65	9.20	—	—	—	86.15

TABLE III

Composition of Colostrum (per cent)

Breed	No. of samples tested	Sp. Gr. at 60° F	Total solids.	Fat.	S.N.F.	Protein	Lactose	Ash.	Water
Rathi	57	1.076	25.571	3.25	22.32	17.22	3.30	1.715	74.429
Sahiwal	—	1.058	22.55	4.6	17.95	18.21	3.30	1.20	77.45

(From the Indian Veterinary Journal



PLACE OF DAIRYING IN CATTLE DEVELOPMENT PROGRAMMES

by M. R. MAHAJAN

MARKETING is the right and ultimate incentive for any increased production and all planning should, in fact, take into account the marketing end. This holds good in the case of all agricultural and industrial commodities. The more the consumption in the market, the more shall be the production incentive provided. The two can keep pace. This applies equally to all developments in the Animal Husbandry field as well in the limitations. The limitations in the field of cattle industry are quite obvious, as cattle rearing to its utility age is a time consuming job. That requires specialisation, as the act of rearing them to their full inherent capacity and exploitation and then their marketing should go hand in hand and the two cannot be separated.

Another important feature in cattle rearing is the confinement of various breeds to their specific home tracts. This is all the more necessary to improve quality in its production by intensive multiplication of breed characteristics and intensification in its performance capacity. The breed of arid zones may not actually thrive in an altogether untoward environment. This means separate markets and marketing practices breedwise, as unlike other commodities in general, it cannot be transhipped from place to place on motives of profit alone. Any shift in the nucleus stock from its original home may in all likelihood prove a permanent loss as no replacement is possible. Cattle marketing, therefore, is a delicate task as any large scale injudicious trading may instead do more harm at the production end as has already happened in the depletion of our best milch stock from their zonal homes and tracts.

Apart from this, dairying on the profitable selling of milk and milk products constitutes a major market for the cattle-rearing profession. Good returns from the dairying ensure a substantial source of income to the farmer or the producer and this lays the very foundation of any cattle husbandry. It induces him to keep heavy yielders which are more economical to him. For apparent reasons he finds his livestock better because every ounce of better feed reflects in his milk pail and finally in his purse. He starts better management practices in order to keep the dry period in his herd at its minimum and infertility at the lowest

obb. The value of the bull is then better known to him as he aims his future generation of stock to excel the performance over their parent stock. He also appreciates better the significance of culling the poor stock and would retain the best to beget in return. He learns to maintain the valuable records pertaining to the calving time, dry period, and date of service etc. to compare and contrast with his past practices to determine his breeding efficiency. In brief dairy revenue is conducive to improved animal husbandry practices as his final success or failure in this undertaking is hinged on these issues. Thus in years to come, such a farmer can have a fine herd which is an asset to the village community. The villagers and those of nearby villages can draw inspiration from his stock and can have reliable nucleus for their herd from him, besides services from the quality bull he maintains or gets with the assistance of the State.

Dairying makes the farmer more progressive in his agricultural outlook, as well. He knows that he is to divert his sizable piece of land out of his fixed holding for fodder cultivation. He sets upon planning as to how best he can have maximum yield from his fields. He looks for better yielding fodder seed strains and with irrigation facilities, he tries to maintain his family and milch herd on the same holding available to him. He takes to intensive agriculture, and coupled with judicious cropping programme and liberal use of fertilizers, he improves his lot. Thus the land development gets a substantial fill-up as a side issue under dairying and he utilises all his farm yard manure for the said objective in view.

Such a farmer living in his own village and on his land by adopting dairying as additional source of supplementing his income can find employment for other members of his family who are not fruitfully employed. He does not need to dispose of his quality stock during the dry period as it costs very little at home to maintain his herd. His free labour of extra members amongst his family, his own land, and village community grazing pastures go a long way to reduce his expenditure during the lean period. He in fact practices the "Mixed Farming" technique—as recommended in our National Plans.

The basic essential for success in his endeavour is that he may be provided with market at his door. His produce may be collected from his village without permitting middle man who takes away a major slice out of his undertaking. He may be spared the trouble of running to the town to ensure proper disposal of his daily milk. In fact he may be encouraged to stay at his place and concentrate more on increased production by better feeding and management of his stock and some other organisation may take over his produce for him and its proper disposal in his interest. That should be the crux of our Dairy planning, of course.

Dairying on profitable selling of milk and milk products constitutes a major market for the cattle rearing profession. Good returns from dairying ensure a substantial source of income to the farmer and this lays the very foundation of any cattle husbandry.

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besides financial assistance of loans or grants that may be rendered to enable him to purchase his stock and the necessary farm equipment. Cooperative pattern of milk collection societies can come to his rescue through which producers like him can avail of the marketing and ancillary transport facilities jointly. The producers of these societies may be given a dominant role in such organisation to enable him to guide his destiny himself and to his advantage though the 'know how' assistance to handle this perishable commodity may be rendered by the experts. That would be an enviable position wherein lot of villages can be improved and for that purpose milk collection scheme may operate far into the interior and cover the breeding tracts completely, in particular.

In the absence of such broad based milk collection schemes, the milk stock starts moving into or near the cities in search of remunerative milk markets. There, the accommodation is insanitary and fodder supply is scanty. The best of our animals go out of form in one lactation and prolonged dry periods in towns prohibit their further maintenance. Their progeny being out of our 'best' succumbs under malnutrition and their return to villages becomes impossible because of heavy transport cost. Such a quality stock is thus lost to the Nation along with the future progeny from them. The vicious cycle further follows in its wake. More useful animals are continuously brought to the cities year after year and meet the same fate after they are out of lactation. This unscruplous dairy trade requires to be checked as the milk stock cannot be replaced at such rapid speed as are being lost in the city life in India. The only alternative is more and more milk collection schemes to cover the major part of rural India. These schemes may not operate just around the city belt where from milk ordinarily flows through private enterprise. It requires collection over wider areas to meet the needs of all breeding tracts and areas. That could only check the tendency of shift in milch stock towards the unfavourable urban areas. This obviously calls for more refrigeration facilities during collection, transport and distribution stages, and with the formation of our national plans in increased power supply there is no doubt that milk industry will develop in the right perspective.

Furthermore, a country like ours where per capita consumption of milk is hardly 5-6 ounces, time probably is not opportune at this juncture for the establishment of dairy plants to manufacture milk powder etc. Even in tracts where milk production is somewhat better, per capita milk consumption is hardly beyond 8 ounces which cannot be termed adequate from any known health standards. Poor economy of the villagers may compel him to forego his already meagre milk quota retention for their own use in order to feed these plants and cost of milk for their own consumption in these areas may actually go up. Moreover professional traders finding better remunerations may be tempted to import more dairy stock in the area operated by a dairy factory as dairy practice in industrial areas means that the dry animals would be got rid of and new animals in lactation from other areas would be brought in from year to year. This does not entail intensive breeding programme in the area nor, in fact, it adds to increase milk production or cattle development in the country. Instead, animals from neigbouring areas would be wasted away. Dairy factories in practice are established to dispose of 'surplus' milk beyoned the needs of fluid milk consumption of the country. That stage obviously has not reached in India. The country may at first attempt to produce more and more quality stock so that the glut production in milk may justify such undertakings at a later stage. These industrialised dairy programmes, therefore, may be given a second thought and may preferably wait till boom in production has been achieved. Too ambitious dairy programme at this stage may actually do more harm than good. Dairy schemes in the present set-up in India have essentially to remain subsidiary to cattle development programme. Cattle rearing is a slow going process and is an ancillary activity to agriculture. The farmer may be helped to raise and improve his milk strain at his own land in his own village. Any deviation of his stock from his land is not in the larger interests of the country. What he requires is the market for his produce at his door and dairy schemes may essentially concentrate at that end in view.

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